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World white teeth

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Summary and Discussion

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Introduction

In the present thesis the first theme concerned the determinants of oral hygiene behavior (OHB) in different samples in diverse contexts. Firstly, the study in chapter 2 was designed to develop an index for OHB and to do a first assessment of how OHB can be predicted on the basis of the Theory of Planned Behavior (TPB). Based on the findings of this study, the studies presented in the chapters 3, 4, and 5 were designed to examine OHB by using the TPB in diverse contexts, including recruits in the Dutch Army, dental care seekers in the Caribbean and in Nepal, and dental patients in Uruguay. In order to increase oral hygiene self-care behavior, interventions should target the determined predictors of OHB. As a central theme of these four cross-sectional studies, this part of the thesis explored whether the determinants of OHB were the same or different in various contexts. The second theme of the present thesis – dealt with in chapters 6 and 7 – concerned the psychological factors related to Oral Health-related Quality of Life (OH-QoL) as assessed by the Dutch version of the Oral Health Impact Profile-14 (OHIP-14-NL) in different contexts, including imprisoned forensic psychiatric patients, students with relatively little experience with dental care, and dental patients with substantial experience with dental care or with dental pathology. The third theme of the present thesis concerned the effects of interventions aimed at improving OHB. In the first study of chapter 6, the effect of oral health care in a forensic psychiatric clinic was examined. The case report in chapter 8 demonstrated a short-time ‘effect’ of a tailored oral hygiene self-care intervention on a imprisoned forensic psychiatric patient’s OH-QoL. The experimental study in chapter 9 was set up to examine the effect of two different persuasive oral health messages in promoting OHB.

Following the PATH (Problem-Analysis-Test-Help) model (Buunk & Van Vugt, 2008) presented in chapter 1, this concluding chapter summarizes the results from the *Test Phase* by discussing the empirical findings in the light of the problem described in the *Problem Phase*, and the health psychological models and theories on health behavior mentioned in the *Analysis Phase*. Next, it presents the empirical findings of the current research in relation to the *Help Phase*, i.e. the practical implications for the development of tailored oral hygiene self-care interventions. The chapter ends with some recommendations for future research followed by a final conclusion.

Empirical findings and Theoretical implications

Oral hygiene behavior (OHB) and the Theory of Planned Behavior (TPB)

On the basis of a Delphi method, the first step in the study presented in chapter 2 entailed the development of a new oral hygiene behavior index (OHB index). Besides developing of the OHB index as a specific health outcome, the second step in this cross-sectional study included determining the predictors and the predictive power of the TPB (i.e., attitude, social norms, and perceived behavioral control), and two other variables, expected social outcomes (ESO) and oral health knowledge related to OHB (OHK). Participants were asked to fill out an Internet questionnaire. The results suggest that the OHB index is a useful method for assessing and evaluating actual oral hygiene self-care behavior of individuals. This index may be used in more theoretical research on the factors determining oral hygiene behavior, as well as in applied research in various contexts to assess the level of oral hygiene behavior.

Moreover, this OHB index maybe useful in clinical settings to assess and monitor the oral hygiene behavior of individual patients (chapter 8).

The validity of the OHB index was supported in chapter 2 by its correlations with all variables of the model of TPB as well as with expected social outcomes and oral health knowledge.

Overall, perceived behavioral control (PBC) was the best predictor, explaining - together with the other four predictors - a substantial amount of the variance (32,3%) in self-reported OHB.

This suggests that the most important factor underlying ineffective OHB, at least in the Dutch sample, is the feeling that one has little control over performing OHB adequately.

In sum, the findings are consistent with the findings of meta-analyses that PBC is a major determinant of a wide range of health behaviors, including oral hygiene self-care behavior (Armitage & Conner, 2001; Defranc, Van den Broucke, Leroy, Hoppenbrouwer, Lesaffre, Martens, Debyser & Declerck, 2008; Godin & Kok, 1996; McCaul, Glasgow & Gustafson, 1985; McCaul, O'Neill & Glasgow, 1988; McCaul, Sandgren, O'Neill & Hinsz, 1993; Renz, Ide, Newton, Robinson & Smith, 2007).

The expanded TPB determinants of OHB were examined in a number of contexts in the Netherlands and abroad. The study reported in chapter 3 showed that among the recruits in Dutch Army ground forces the intention to perform OHB was predicted independently by PBC and attitude. For actual OHB, attitude was the only significant predictor. In the studies reported in chapter 4, OHB of dental care seekers appeared to be determined by attitude and social norms (SN) in the Caribbean (Aruba and Bonaire), and by PBC and ESO in Nepal.

Furthermore, the results of chapter 5 showed that OHB among Uruguayan dental patients was, like in the Caribbean, determined by attitude and SN. Thus, in most contexts, attitudes toward adequate OHB and oral hygiene self-care as well as the perceived norms of relevant others toward such behaviors may be considered as important determinants of OHB. However, while the TPB thus seemed a useful approach to study OHB, the relative importance of the various determinants in predicting OHB strongly diverged between contexts. Especially noteworthy is the finding that in Nepal, attitude en social norms were not related to OHB. This may suggest that in developmental countries rational decision making with respect to OHB, and maybe with respect to health behavior in general, is less pronounced than in developed countries.

The fact that not all three TPB variables, contributed in all contexts to the prediction of OHB, does not imply a lack of the TBP model. An explanation could be that the determinants of the model have a differential impact on the intention to perform OHB depending on the stage in the behavioral change phase of the individuals in the diverse contexts (Prochaska & DiClemente, 1992). Specifically, it may be that people in Nepal are still in the pre-contemplation or may be in the contemplation phase in which it is first important to enhance the knowledge about adequate OHB, and to give instructions on how to perform adequate OHB. It seems likely that attitudes and social norms become only important once a certain level of knowledge about oral hygiene, and about how to improve it, is attained. In addition, in Uruguay the effect of social norms of the dentist and the family was especially strong. This may be due to a more hierarchal structure and collectivistic nature of this society. These findings suggest that in Uruguay, and probably in other countries too, it may be recommendable to incorporate the social influence exerted by dental professionals and the family may in interventions aimed at improving patients OHB (Adair, Pine, Burnside, Nicoll, Gillett & Anwar, 2004; Parodi, 2008).

The addition of two psychological variables to the TPB – OHK and ESO – proved useful: They were relevant determinants of OHB as well (chapter 2 and 4). This underlines that an open approach of researchers to the possibility of adding constructs to an existing model is necessary, certainly when the criterion behavior is studied in different contexts. To get insight into the variables that may be important in a given context, it is recommendable, before carrying out studies on determinants on OHB, to pay attention to possibly relevant values and practices related to the behavior under consideration. People with different cultural backgrounds may have quite different values and practices. For example, for the Nepalese, tooth brushing is part of their bath ritual and has primarily a symbolic meaning in the sense of fostering purity. Therefore, individuals in this culture may not be inclined to practice OHB as defined in this study when they do not feel able to do so (Godin, Maticka-Tyndale, Adrien, Manson-Singer, Willms & Cappon, 1996). Therefore, the methods and measures need to be made appropriate for diverse contexts, including populations not used to regular Western research methods (chapter 4 and 5).

Oral Health-related Quality of Life (OH-QoL)

The second theme in the present dissertation concerned the psychological factors related to OH-QoL. These determinants are important for the development and evaluation of oral health interventions as the individual's OH-QoL is often considered a relevant target of such interventions. Therefore, the psychological causes and effects of OH-QoL, as assessed with the Dutch Oral Health Impact Profile-14 (OHIP-14-NL) were examined in three different contexts.

The results of the first study in chapter 6 showed in a test-retest analysis that the psychometric qualities of the OHIP-14-NL scale were satisfactory. In addition, the results of the second study in the same chapter showed that self-perceived OH-QoL among forensic psychiatric patients was predicted jointly by dental anxiety and unhealthy dentition. Individuals with a high level of anxiety for dental treatment, and, independent thereof, a poor dentition, reported a lower OH-QoL. The studies reported in chapter 7 mapped the relations of general health perception, social factors, dental anxiety and oral hygiene behavior on the one hand with OH-QoL on the other hand. In the patient sample, the clinical variable dentition characteristic was added. The results showed that self-perceived OH-QoL among dental patients was predicted by dentition characteristics, ESO, and dental anxiety, whereas self-perceived OH-QoL among students was determined only by general health perception together with ESO. Thus, as was the case among forensic psychiatric patients, among dental patients dental anxiety was an important determinant of a low OH-QoL. Remarkably, among both dental patients and students, ESO was a relevant predictor of OH-QoL. However, among dental patients ESO were associated with a lower OH-QoL, whereas among students ESO were associated with a higher OH-QoL. Although not all relations could be interpreted unequivocally, the pattern of findings from chapters 6 and 7 illustrated that differences between the samples (forensic, experience with dental treatment and oral disease or not) influenced the psychological processes involved in OH-QoL. The case report described in chapter 8 showed that a Dutch forensic psychiatric patient's adequate OHB may have played an important role in the reduction of halitosis and in increased OH-QoL. Moreover, this study suggested that the retrospective version of the OHIP-14-NL may be an adequate method to assess self-perceived OH-QoL within a relative short period of time. In sum, the

relations of different variables with OH-QoL differed between samples. Thus, oral health interventions directed at increasing OH-QoL have to be adapted to populations in diverse contexts.

Although OH-QoL was predicted by a number of variables, it must be noted that the amount of explained variance (7.6%) was small, and that some of the seemingly relevant variables were hardly related to OH-QoL. In particular, OHB was not related to OH-QoL. Both possible explanations - inadequate oral hygiene behavior indirectly lowers OH-QoL and a low OH-QoL is a motivator of oral hygiene behavior - were not supported by the data. Despite the fact that the studies were conducted in a realistic setting, answers for these findings are not available yet, and these processes are still not well understood.

Moreover, the range in scores of OH-QoL was quite limited, and overall, individuals had a high level of OH-QoL (chapter 7). This suggests that the OHIP-14-NL measure may not be optimal for assessing OH-QoL. This measure seems to assess primarily if one is satisfied with one's teeth. In addition, one may wonder if quality of life (QoL) is a very relevant concept in the context of oral health care and whether the experiential aspects of oral health are not better understood through explicit measures of, for example, dental pain and dental anxiety. In addition, people are in general not very aware of their OH-QoL; moreover, they may often adapt to dental limitations, handicaps and impairments, and may not notice these any longer. It is therefore not yet completely clear how relevant this measure is for the clinical practice.

Persuasive health communication and OHB

The third, and final, theme of the present thesis concerned the effects of interventions aimed at improving OHB. In chapter 6, the effect of oral health care in a forensic psychiatric clinic was examined. Although the study did not include a control group, the findings did suggest that oral health care in this context may improve the perceived OH-QoL among imprisoned forensic psychiatric patients. In addition, a case report of the effects of an oral hygiene self-care intervention with one patient (chapter 8), suggested that such an intervention may be quite effective in reducing halitosis, and in improving OHB. These results were only descriptive. The study reported in chapter 9 was set up to examine in a more controlled way the effects of oral health care interventions. Specifically, this study assessed the extent to which the persuasive effects of positively and negatively framed messages designed to promote OHB, were moderated by two individual difference measures (regulatory focus and level of education) and a contextual difference (country). The results showed that regulatory focus and level of education moderated the persuasive effects of both message frames in a naturalistic setting; in the dental clinic of the dental school. A positively framed message was especially persuasive among individuals with a promotion focus, strongly oriented toward the benefits of a good health in general. This effect was more pronounced in Uruguay than in Spain. Although not all results patterns could be explained satisfactorily, the patterns strongly suggest that messages tailored to individual differences and contexts may be particularly effective.

Moreover, the results suggest that, if one would have to use a single approach, the preferred default option would be to emphasize the benefits of having healthy teeth rather than emphasizing the costs and possible negative outcomes of unhealthy teeth, for instance cavities and bad smell. This is in line with the evidence that, in general, gain-framed

messages produced greater increases in attitude, intentions, and behaviors than loss-framed messages (Fink, 2008; Rothmann, Martino, Bedell, Detweiler & Salovey, 1999; Sherman, Updegraff & Mann, 2008).

Limitations

The studies reported in the present thesis, have several limitations concerning design, population selection, contextual issues, self-reported OHB, and generalizability. While most studies in social psychology are experimental, most real life settings and field studies in this thesis contain cross-sectional data (self-report indicators are related to OHB and OH-QoL as measured by self-report questionnaires). This implies that the resultant correlations between the variables may not indicate a causal association, whereby one variable causes another. However, as the main aim of this thesis was to explore and test the psychological factors related to OHB and OH-QoL, the cross-sectional character of most studies serves this purpose rather well.

Other limitations refer to the representativeness of the samples, especially in terms of gender, age, marital status, and level of education. The large proportion of female participants (more than two-third of the samples) in the samples presented in chapter 2, 7, and 9, and the predominantly male participants (92% to 100%) in the samples presented in chapter 3 and 6 may have biased some of the results. Other characteristics among the different samples were diverse too, indicating that the findings in, for example, a selective sample of mainly relatively young, high-educated, unmarried women (chapter 2 and 7) versus a selective sample of mainly relatively older, low-educated, imprisoned men (chapter 6), cannot, by definition, be considered representative of the different populations they were recruited from. Although the Uruguayan sample (chapter 5) seemed quite representative regarding various socio-demographic variables, the fact that they were relatively highly educated compared with the general population living in the country side, may have influenced the results of the persuasive health communication research (chapter 9). Finally, the qualitative and descriptive nature of the case report presented in chapter 8 must be appreciated as a clinical sample focusing on the psychological and behavioral aspects of OHB and OH-QoL. Nevertheless, despite the above limitations, the data gathered in this thesis were appropriate to explore the sample differences in the context of future development of tailored OHB interventions, adapted to the specific populations in diverse contexts.

Practical implications

The results of the present thesis may have several practical implications. First, the expanded TPB model and the conceptual model of OH-QoL included in the process model may be helpful perspectives to guide practice in OHB and related QoL. Moreover, with the help of the valid and reliable produced questionnaires used in this thesis to measure the concepts featured in the models, the determinants of OHB and OH-QoL can be identified and targeted for preventive interventions among populations in diverse contexts. The specific associations of the determinants of OHB and OH-QoL should be considered when designing practical recommendations for improving OHB and OH-QoL in developing and underdeveloped countries. Given the fact that most individuals, the young ones as well as the elderly, take care of their teeth and pay attention to their oral hygiene self-care practices based on their own knowledge and skill's, the present thesis may help to examine and understand why

determinant-analyses are important to get insight in the motivation to perform adequate OHB. In general, the results suggest that, in order to increase oral hygiene self-care behavior, interventions should in some populations or in some contexts target not only the well-known determinants from the TPB and OHK, but especially the target individual's ESO of having healthy teeth.

In addition, the findings can be used to develop specific strategies or tailored oral hygiene self-care interventions. For oral health professionals it may be fruitful to evaluate if a person is promotion or prevention focused. Before screening or during intake the individual may complete the *promotion-prevention focus* scale used in this thesis. After the dental hygienist or dentist determine the individual's motivation and focus, the information can be framed accordingly. The information could emphasize either the positive outcomes of OHB or the negative outcomes, tailored to the individuals' preference and focus. In addition, feedback about oral hygiene self-care to motivate individuals can be given by using the internet to stimulate and monitor their personal oral hygiene.

Recommendations for future research

The results of the studies suggest recommendations for future research with respect to the design. Future studies should take us one step further, using longitudinal and experimental studies in diverse populations. Especially, it seems important to examine whether the determinants found in several studies are actual causes of OHB and OH-QoL in the specific target group. In addition, the provided insights ask for future investigation that should address whether the identified psychological factors and the specified message framing for OHB advices in the different populations in diverse contexts do actually increase populations' OHB and OH-QoL. For example, potential target groups such as youth, adolescents, adults, elderly or disabled people ask for specific approaches which fit their preferences and needs. After all, OHB and OH-QoL are highly individualized concepts, the perception of which are affected by individuals' cultural background and socio-economical status. In addition, on the basis of the principle of target group segmentation (Ahmad, 2003) not only the causes and effects of OH-QoL, but also of OHB must be studied in each segment that will be targeted (Baker, 2007). Moreover, it would not only be interesting, but also important for future research to examine the persuasive communication effects among various groups in diverse contexts (Sherman et al., 2008).

The Final Perspective

The type of research reported in this thesis is only one form of applied research in the field of social psychology. Typically, it addressed a real-life topic (oral health), it focused on relevant outcomes (OHB and OH-QoL), in other populations than only academic students. The research in the present thesis must be understood against the background of the state-of-the-art in the scientific and practical psychology of oral health behavior: Although our scientific knowledge on, for example, dental fear is substantial, the scientific knowledge on especially the psychological determinants of OHB is rather poor. Moreover, the practice of the development of oral health promotion interventions needs input on the important issue of target group segmentation or tailoring. The research in this thesis aimed to provide scientific knowledge to inspire further scientific research on the psychology of oral health as well as to inspire the practice of oral health promotion. As most chapters have been published, or

will be published soon, it can be expected that at least a part of the knowledge gathered in this thesis will find its way to scientists and practitioners.

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